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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/531,633	03/21/2000	Zhe Li		6773

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Zhe Li
1 Argent Drive
Poughkeepsie, NY 12603

EXAMINER
GARCIA OTERO, EDUARDO

ART UNIT	PAPER NUMBER
2123	3

DATE MAILED: 07/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/531,633	LI, ZHE	
	Examiner	Art Unit	
	Eduardo Garcia-Otero	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 March 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 March 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION: Non-Final (first action on the merits)

Introduction

1. Title is: METHOD FOR CONDITIONAL TAUTOLOGY CHECKING
2. First named inventor is: LI.
3. Claims 1-17 have been submitted, examined, and rejected.
4. Priority is claimed to provisional application 60/125,835 filed 3/24/1999.
5. The Draftperson has approved the drawings.

Index of Prior Art

6. **Simpson** refers to US Patent 5,642,304.
7. **Okuzawa** refers to US Patent 5,243,538.
8. **Tucker** refers to The Computer Science and Engineering Handbook, by Allen B. Tucker, CRC Press, ISBN: 0-8493-2909-4, 1996.

Specification-objections-definition of cube

9. The Specification is objected to because of the following informalities. Appropriate correction is required.
10. There are some issues regarding the term "cube". Applicant's definition of "cube" is very unclear. Further, it does not match a detailed definition of "cube" found in the art (Simpson). Specifically, it is not clear whether Applicant's "cube" is intended to be a single point or single vertex (like Simpson), or if Applicant intends some broader definition which would include multiple points or vertices.
11. Additionally, it is not clear whether Applicant intends to consider the value "X" from . Said value "X" is specifically mentioned in Simpson's definition
12. The Examiner will use Simpson's definition for purposes of examination because it is more clear and detailed, and because the Examiner is not certain what the Applicant intends. The two definitions by Applicant and Simpson follow. These definitions may be equivalent, or may overlap, or one may be a subset of the other.
13. Applicant defines "cube" at Specification page 6 as **"A cube is the subset of the input space where some input variables are substituted with Boolean constant 1 and some other input variables are substituted with Boolean constant 0."**

14. Thus, Applicant's definition of "cube" appears somewhat different than the definition given by Simpson at Column 13 line 28:

> The definition of a cube is a boolean term in which each coordinate represents a variable of two values. The universe of n Boolean variables can be thought of as an n-dimensional space in which each coordinate represents a variable of two values, 0 or 1. Each lattice point, called a vertex, in this n-dimensional space represents a minterm, and a special collection of these minterns form an implicant, which is seen as a cube of vertices. The usual definition of a cube is an n-tuple vector of 0, 1 and X, where 0 means the complement value of the variable, 1 represents the true value, and X denotes either 0 or 1 or both values of the variable. A list of cubes represents the union of the vertices covered by each cube and is called a cubical cover of the vertices, or simply a cover.

15. Because of these issues regarding "cube", the following written description rejection is applied.

Claim Rejections - 35 USC § 112- first paragraph- description

16. The following is a quotation of the first paragraph of 35 U.S.C. 112: The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

17. Claim 1-17 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the disclosure in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

18. Specifically, Claim 1 states "cube". The specification does not describe this term sufficiently to reasonably convey possession of the claimed invention.

19. Independent Claim 1 is rejected because the term **"cube"** is not described in the disclosure in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specification page 6 states "A cube is the subset of the input space where some input variables are

substituted with Boolean constant 1 and some other input variables are substituted with Boolean constant 0."

20. It is not clear whether Applicant intends the term "cube" to refer to a single input vector (or lattice point to use Simpson's terminology) as specified by Boolean constants for all input variables, or whether Applicant intends "cube" to refer to a set of points (or region of input space) where only some of the input variables are substituted with constants but other input variables may remain undefined. Dependent claims 2-17 are rejected for the same reason as independent claim 1.

Claim Rejections - 35 USC § 112-Second Paragraph-indefinite claims

21. The following is a quotation of the second paragraph of 35 U.S.C. 112: The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

22. **Claims 1-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite** for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

23. Independent Claim 1 is rejected because the term **"cube"** renders the claim indefinite. Specification page 6 states "A cube is the subset of the input space where some input variables are substituted with Boolean constant 1 and some other input variables are substituted with Boolean constant 0."

24. It is not clear whether Applicant intends the term "cube" to refer to a single input vector (or lattice point to use Simpson's terminology) as specified by Boolean constants for all input variables, or whether Applicant intends "cube" to refer to a set of points (or region of input space) where only some of the input variables are substituted with constants **but other input variables may remain undefined.** Dependent claims 2-17 are rejected for the same reason as independent claim 1.

25. The Examiner will interpret "cube" as referring to a single input vector (or lattice point), with all input variables substituted by Boolean constants, and no input variables may remain undefined.

26. Independent Claims 7 and 12 are rejected because the term "subset of the input space is represented as a first **range of binary integers"** renders the claim indefinite. It is not clear

how a subset of a Boolean input space may be represented by a "range" of binary integers. Every point of the input space is represented by a unique set of binary integers. Applicant's use of the term "range" in this context is not clear. Dependent claims 8-10 are rejected for the same reason as claim 7. Dependent claims 13-15 are rejected for the same reason as independent claim 12.

Claim Rejections - 35 USC § 103

27. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action: (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

28. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

    Determining the scope and contents of the prior art.

    Ascertaining the differences between the prior art and the claims at issue.

    Resolving the level of ordinary skill in the pertinent art.

    Considering objective evidence present in the application indicating obviousness or nonobviousness.

29. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable.

30. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication.

31. Claim 1 is an independent claim with 3 limitations.

32. A-**receiving said Boolean function, said Boolean constant and said given subset of the input space** is disclosed by Okuzawa FIG 1 "BOOLEAN EXPRESSION" and "TRUTH TABLE".

33. B(part two)-[dividing said given subset of the input space into a set of a plurality of smaller subsets of the input space,] **whereby the conclusion is positive if said Boolean function is equivalent to said Boolean constant within every member of said set of a plurality of smaller subsets of the input space** is disclosed by Okuzawa at FIG 1 "COMPARISON".

34. Okuzawa does not expressly disclose the remaining limitation.

35. B(part one)-**dividing said given subset of the input space into a set of a plurality of smaller subsets of the input space** is disclosed by Tucker at page 287 "A divide-and-conquer" algorithm first splits the problem to be solved into subproblems that are easier to solve than the original problem either because they are smaller instances of the original problem, or because they are different but easier problems", and Tucker page 2034 "Parallel Functional Programming... determining the appropriate granularity", and MPEP 2144.04(VI)(B) *In re Harza* (legal precedent for duplication), 274 F.2d 669, 124 USPQ 378, 380 (CCPA 1960) which states "It is well settled that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced". See MPEP 2144.04(VI)(B). In this claim, duplicating the part does not produce any new result and does not produce any unexpected result. Note dividing the single given subset of input space into multiple smaller subsets (duplicating the part) does not produce any new and unexpected result. Also see MPEP 2144.04(IV)(A) regarding changes in size and proportion.
36. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Tucker and MPEP 2144.04(VI)(B) to modify Okuzawa. One of ordinary skill in the art would have been motivated to do this to simplify the equivalence comparison by comparing a single logical expression at a time (Tucker) or a single input point at a time (MPEP 2144.04(VI)(B)), and thus to reduce the resources required (such as RAM) to perform the equivalence comparison, and/or to speed calculations by allowing parallel processing of smaller subsets.
37. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication and Simpson.
38. Claim 2 depends from claim 1, with two additional limitations.
39. B-**simplifying, if said given subset of the input space is a cube, said Boolean function with substituting the input variables in said Boolean function with Boolean constants according to the definition of said cube, whereby the conclusion is positive if the simplification result is said Boolean constant, and the conclusion is negative if the simplification result is a Boolean constant other than said Boolean constant** is disclosed by Okuzawa FIG 1 "SIMPLIFICATION" and "COMPARISON".
40. Okuzawa does not expressly disclose the remaining limitation.

41. A-**determining whether said given subset of the input space is a cube** is disclosed by Simpson Column 13 line 28 "cube".
42. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication and Simpson.
43. Claim 3 depends from claim 2, with one additional limitation.
44. **replacing said Boolean function with the simplification result of the simplifying step before the dividing step, whereby the simplification result is used as said Boolean function in all later steps** is disclosed by Okuzawa FIG 1 "SIMPLIFICATION" and "COMPARISON".
45. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication.
46. Claim 4 depends from claim 1, with one additional limitation.
47. **a member of said set of a plurality of smaller subsets of the input space is a cube within said given subset of the input space, whereby it is possible to substitute the input variables in said Boolean function with Boolean constants according to the definition of said cube** is disclosed by Okuzawa FIG 1 "SIMPLIFICATION" and "COMPARISON".
48. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication.
49. Claim 5 depends from claim 4, with one additional limitation.
50. **simplifying said Boolean function with substituting the input variables in said Boolean function with Boolean constants according to the definition of said cube, whereby the conclusion is positive if the simplification result is said Boolean constant, and the conclusion is negative if the simplification result is the Boolean constant other than said Boolean constant** is disclosed by Okuzawa FIG 1 "SIMPLIFICATION" and "COMPARISON".
51. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication.
52. Claim 6 depends from claim 5, with one additional limitation.
53. **repeating the dividing step and the simplifying step if the simplification result is not a Boolean constant, whereby said cube is smaller and the simplification result will**

eventually be a Boolean constant when said cube is small enough is disclosed by Okuzawa FIG 1 "SIMPLIFICATION" and "COMPARISON".

54. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication.
55. Claim 7 depends from claim 4, with one additional limitation.
56. **said given subset of the input space is represented as a first range of binary integers** is disclosed by Okuzawa FIG 1 "LOGIC CIRCUIT TRUTH TABLE BOOLEAN EXPRESSION".
57. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication.
58. Claim 8 depends from claim 7, with one additional limitation.
59. Okuzawa does not expressly disclose the remaining limitation.
60. **said set of a plurality of smaller subsets of the input space has only two members; said cube which is represented as a second range of binary integers, and a second member which is represented as a third range of binary integers, whereby said third range of binary integers is divided repeatedly into cubes and such divisions do not need to all complete if the negative conclusion is given for any of these cubes** is disclosed by is disclosed by Tucker at page 287 "A divide-and-conquer" algorithm first splits the problem to be solved into subproblems that are easier to solve than the original problem either because they are smaller instances of the original problem, or because they are different but easier problems", and Tucker page 2034 "Parallel Functional Programming... determining the appropriate granularity", and MPEP 2144.04(VI)(B) *In re Harza* (legal precedent for duplication), 274 F.2d 669, 124 USPQ 378, 380 (CCPA 1960) which states "It is well settled that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced". See MPEP 2144.04(VI)(B). In this claim, duplicating the part does not produce any new result and does not produce any unexpected result. Note dividing the single given subset of input space into multiple smaller subsets (duplicating the part) does not produce any new and unexpected result.

61. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication and further in view of MPEP 2144.04(IV)(A) legal precedent for changing size/proportion.
62. Claim 9 depends from claim 8, with one additional limitation.
63. Okuzawa does not expressly disclose the remaining limitation.
64. **replacing said given subset of the input space, represented by said first range of binary integers, with said second member of said set of a plurality of smaller subsets of the input space, represented by said third range of binary integers, after finishing all steps related to said cube and said second range of binary integers which represents said cube, whereby said given subset of the input space become smaller and smaller and whether said Boolean function is equivalent to said Boolean constant within said given subset of the input space can be determined using simplification when said subset of the input space eventually becomes a cube** is disclosed by Tucker at page 287 "A divide-and-conquer" algorithm first splits the problem to be solved into subproblems that are easier to solve than the original problem either because they are smaller instances of the original problem, or because they are different but easier problems", and Tucker page 2034 "Parallel Functional Programming... determining the appropriate granularity", and is disclosed by 2144.04(IV)(A) legal precedent for changing size/proportion. *In re Rinehart*, 531 F.2d 1048, 1953, 189 USPQ 143, 148 (CCPA 1976) states "mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled". Similarly, merely shifting the regions of the input space being considered would not establish patentability.
65. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication and further in view of MPEP 2144.04(IV)(A) legal precedent for changing size/proportion.
66. Claim 10 depends from claim 9, with one additional limitation.
67. Okuzawa does not expressly disclose the remaining limitation.
68. **shifting a boundary of said third range of binary integers before the replacing step if the corresponding boundary of said first range of binary integers is shifted, whereby a boundary of said first range of binary integers can shift dynamically** is disclosed by

Tucker at page 287 "A divide-and-conquer" algorithm first splits the problem to be solved into subproblems that are easier to solve than the original problem either because they are smaller instances of the original problem, or because they are different but easier problems", and Tucker page 2034 "Parallel Functional Programming... determining the appropriate granularity", and is disclosed by 2144.04(IV)(A) legal precedent for changing size/proportion. *In re Rinehart*, 531 F.2d 1048, 1953, 189 USPQ 143, 148 (CCPA 1976) states "mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled". Similarly, merely shifting a boundary of the input space being considered would not establish patentability.

69. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication.
70. Claim 11 depends from claim 4, with one additional limitation.
71. **substituting the input variables in said Boolean function with Boolean constants according to the definition of said cube, whereby any tautology checking method can be used to process the Boolean function resulted from the substitution** is disclosed by Okuzawa FIG 1 "SIMPLIFICATION" and "COMPARISON".
72. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication.
73. Claim 12 depends from claim 11, with one additional limitation.
74. **said given subset of the input space is represented as a first range of binary integers** is disclosed by Okuzawa FIG 1 "LOGIC CIRCUIT TRUTH TABLE BOOLEAN EXPRESSION".
75. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication and further in view of MPEP 2144.04(IV)(A) legal precedent for changing size/proportion.
76. Claim 13 depends from claim 12, with one additional limitation.
77. Okuzawa does not expressly disclose the remaining limitation.
78. **said set of a plurality of smaller subsets of the input space has only two members: said cube which is represented as a second range of binary integers, and a second member**

which is represented as a third range of binary integers, whereby said third range of binary integers is divided repeatedly into cubes and such divisions do not need to all complete if the negative conclusion is given for any of these cubes is disclosed by Tucker at page 287 "A divide-and-conquer" algorithm first splits the problem to be solved into subproblems that are easier to solve than the original problem either because they are smaller instances of the original problem, or because they are different but easier problems", and Tucker page 2034 "Parallel Functional Programming... determining the appropriate granularity", and is disclosed by 2144.04(IV)(A) legal precedent for changing size/proportion. *In re Rinehart*, 531 F.2d 1048, 1953, 189 USPQ 143, 148 (CCPA 1976) states "mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled". Similarly, merely changing the size of the input space being considered would not establish patentability.

79. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication and further in view of MPEP 2144.04(IV)(A) legal precedent for changing size/proportion.
80. Claim 14 depends from claim 13, with one additional limitation.
81. Okuzawa does not expressly disclose the remaining limitation.
82. **replacing said given subset of the input space, represented by said first range of binary integers, with said second member of said set of a plurality of smaller subsets of the input space, represented by said third range of binary integers, after finishing all steps related to said cube and said second range of binary integers which represent said cube, whereby said given subset of the input space become smaller and smaller and whether said Boolean function is equivalent to said Boolean constant within said given subset of the input space can be determined using simplification when said given subset of the input space eventually becomes a cube** is disclosed by Tucker at page 287 "A divide-and-conquer" algorithm first splits the problem to be solved into subproblems that are easier to solve than the original problem either because they are smaller instances of the original problem, or because they are different but easier problems", and Tucker page 2034 "Parallel Functional Programming... determining the appropriate granularity", and is disclosed by

2144.04(IV)(A) legal precedent for changing size/proportion. *In re Rinehart*, 531 F.2d 1048, 1953, 189 USPQ 143, 148 (CCPA 1976) states "mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled". Similarly, merely shifting the boundaries of the input space being considered would not establish patentability.

83. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication and further in view of MPEP 2144.04(IV)(A) legal precedent for changing size/proportion.
84. Claim 15 depends from claim 14, with one additional limitation.
85. Okuzawa does not expressly disclose the remaining limitation.
86. **shifting a boundary of said third range of binary integers before the replacing step if the corresponding boundary of said first range of binary integers is shifted, whereby a boundary of said first range of binary integers can shift dynamically** is disclosed by Tucker at page 287 "A divide-and-conquer" algorithm first splits the problem to be solved into subproblems that are easier to solve than the original problem either because they are smaller instances of the original problem, or because they are different but easier problems", and Tucker page 2034 "Parallel Functional Programming... determining the appropriate granularity", and is disclosed by 2144.04(IV)(A) legal precedent for changing size/proportion. *In re Rinehart*, 531 F.2d 1048, 1953, 189 USPQ 143, 148 (CCPA 1976) states "mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled". Similarly, merely shifting the boundaries of the input space being considered would not establish patentability.
87. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication, and Simpson.
88. Claim 16 depends from claim 1, with two additional limitations.
89. B-**substituting, if said given subset of the input space is a cube, the input variables in said Boolean function with Boolean constants according to the definition of said cube, whereby any tautology checking can be used to process the Boolean function resulted**

from the substitution is disclosed by Okuzawa FIG 1 "SIMPLIFICATION" and "COMPARISON".

90. Okuzawa does not expressly disclose the remaining limitation.

91. A-**determining whether said given subset of the input space is a cube** is disclosed by Simpson Column 13 line 28 "cube".

92. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuzawa in view of Tucker and MPEP 2144.04(VI)(B) legal precedent for duplication.

93. Claim 17 depends from claim 1, with one additional limitation.

94. Okuzawa does not expressly disclose the remaining limitation.

95. **starting a process for each member of said set of a plurality of smaller subsets of the input space determining whether said Boolean function is equivalent to said Boolean constant within said member of said set of a plurality of smaller subsets of the input space, whereby these processes can run on the same computer or on several computers, at the same time or at different times** is disclosed by Tucker at page 287 "A divide-and-conquer" algorithm first splits the problem to be solved into subproblems that are easier to solve than the original problem either because they are smaller instances of the original problem, or because they are different but easier problems", and Tucker page 2034 "Parallel Functional Programming... determining the appropriate granularity", and is disclosed by MPEP 2144.04(VI)(B) *In re Harza* (legal precedent for duplication), 274 F.2d 669, 124 USPQ 378, 380 (CCPA 1960) which states "It is well settled that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced". In this claim, duplicating the part does not produce any new result and does not produce any unexpected result. Note dividing the single given subset of input space into multiple smaller subsets (duplicating the part) does not produce any new and unexpected result. Also see MPEP 2144.04(IV)(A) regarding changes in size and proportion.

MOTIVATION FOR CLAIMS 2-17

96. **At the time** the invention was made, one of ordinary skill would have begun with Okuzawa FIG 1 for verification by simplification and comparison. One of ordinary skill would then turn to Simpson for the basic Boolean "cube" system in order to clearly define the possible input space for purposes of subdividing the problem. One of ordinary skill would then turn

to Tucker or to legal precedents from MPEP 2144.04(VI)(B) and MPEP 2144.04(IV)(A) to divide the input space into multiple regions and/or into smaller regions. One of ordinary skill in the art would have been motivated to do this to simplify the equivalence comparison by comparing a small regions at a time, and/or to reduce the resources required (such as RAM) to perform the equivalence comparison, and/or to speed calculations by allowing parallel processing of smaller subsets.

Additional Cited Prior Art

97. The following US patents or publications are hereby cited as prior art, but have not been used for rejection. Applicant should review these carefully before responding to this office action.

98. Jain US Patent 6,389,374 discloses "sampling subspaces of a Boolean space" at Abstract.

99. Li US Patent 6,339,837 discloses "function verification... equivalent to a predetermined constant" at Abstract.

100. "Logic Verification using Binary Decision Diagrams in a Logic Synthesis Environment" by Sharad Malik et al., 1988 IEEE, pages 6-9, discloses "formal logic verification" at Abstract.

101. "Boolean Functions Classification via Fixed Polarity Reed-Muller Forms" by Chien-Chung Tsai et al., 1997 IEEE TRANSACTIONS ON COMPUTERS, Vol 46, No. 2, pages 173-186 discloses "functional equivalence" at Abstract.

Conclusion

102. All pending claims are rejected.

Communication

103. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo Garcia-Otero whose telephone number is 703-305-0857. The examiner can normally be reached on Monday through Thursday from 9:00 AM to 7:00 PM.

104. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at (703) 305-9704. The fax phone numbers for this group are:

105. (703) 746-7238 --- for communications after a Final Rejection has been made;

106. (703) 746-7239 --- for other official communications; and

107. (703) 746-7240 --- for non-official or draft communications.

108. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.

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KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER